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The Global Home of Chemical Engineers

MESD
Materials Engineering & Sciences Division
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MESD Newsletter

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Notes from the Chair

Dear MESD Members and Friends,

It is often said that change is a constant, and whether you recognize it or not, MESD continues to change. Although this newsletter comes to you but once a year and often serves as a yearly status update, it seems appropriate to bring some of those changes to light, particularly as many have occurred over long time frames. Over the past few years and with the help of many members and leadership teams, MESD has pursued various initiatives and responded to certain challenges in ways that have, and I hope you will agree, helped to enhance the division, its functioning, and its impact.

Efforts have been made to improve and refresh Area programming while meeting mandatory limits on the number of oral sessions. We have followed the Institute's lead in emphasizing quality poster sessions and creating and strengthening interactions with industry. With the continued support of Owens-Corning and new support from Braskem America, the division is able to continue its remarkable plenary session and awards. To their credit, many Areas have initiated plenary-style and graduate award sessions that resonate with members, helping to make the AICHE Annual meeting an important forum for their research efforts and for launching careers. While every year marks a change in leadership that refreshes the talent and vision that guides MESD at the division and area levels, having formalized roles has helped MESD continue to function smoothly. It all adds up to what I believe is a strong division, continuing to evolve and to serve its members and the profession.

You will read about the nominees for various MESD Executive Council roles at the end of this newsletter, and an election will soon follow. When you do receive an email from AICHE apprising you that the MESD election is open on-line, I ask that you take an active role and cast your ballot. In addition, I hope you will participate in Area business meetings (always conducted Tuesday early evening during the National meeting). The vitality of the division and areas benefit from your willingness to be engaged and to volunteer your time. Areas also will elect new leadership at their business meetings. I hope you lend your voice to those decisions and also consider volunteering to organize and chair sessions at subsequent National meetings. The openness and accessibility of MESD is a key hallmark, and all are welcome to participate and to be involved.

Inside this issue

We have a full program slated for San Francisco. With meeting rooms being limited, MESD programming will stretch over the entire week but the plenary session remains in its usual Wednesday morning timeslot. At that plenary session, Prof. Bradley Chmelka of the University of California, Santa Barbara will be receiving the Braskem Award for Excellence in Materials Engineering and Science. Prof. Chemelka is being honored "For molecular analyses and understanding of the syntheses, compositions, structures, and properties of heterogeneous inorganic materials for engineering applications in catalysis, separations, and mechanical structures." In addition, Prof. Jeffrey Rimer of the University of Houston will receive the Owens-Corning Early Career Award. Prof. Rimer's recognition is for "Transformative discoveries of zeolite growth mechanisms, breakthroughs in crystal engineering and rational design of therapeutics for pathological diseases, and pioneering in situ AFM to analyze solvothermal crystallization." Each will be giving an award lecture which, along with other invited lectures, will showcase the breadth of cutting-edge research reflected through MESD.

Also on the matter of programming, I want to acknowledge with gratitude the efforts of Prof. Julie Liu (1st Vice Chair) as well as the work of the Area leaders. Organizing the programming for a large, multi-faceted division is no small feat, and space restrictions of the San Francisco meeting location coupled with a large number of submissions brought additional challenges during session organization activities in May and June. I also want to thank Prof. Megan Robertson (MESD

Director), who agreed to take on the responsibilities of organizing and administering the MESD poster session at this year's meeting. I know she looks forward to the contributions of those who have agreed to serve as judges for the MESD poster session on Monday evening. I hope you will attend and be engaged in the poster session (Monday early evening, before social events) and, in so doing, help contribute to its vibrancy.

Finally, I express my gratitude to the members of the Executive Council, Area Chairs and co-Chairs – it has been a distinct pleasure to serve with them. On behalf of the entire division, I also thank Prof. Alon McCormick and Prof. Don Baird for years of faithful service to MESD: Until this past year, Prof. McCormick served as CTOC liaison to MESD, and in that role he was an excellent advisor to and advocate for MESD. After working to establish the Owens Corning Early Career Award and chairing the committee for several years, Prof. Baird has expressed a desire to step away from that role. In function and operation I expect MESD will handle these changes in stride and continue its growth. I hope you will continue to support the division and work to that end. I look forward to seeing you in San Francisco!

Mike Kilbey

Chair, MESD 2015-2016

Professor, Departments of Chemical & Biomolecular Engineering and Chemistry

University of Tennessee-Knoxville

MESD Plenary and Poster Awards

At the 2015 MESD Plenary, Prof. Karen Gleason of MIT received the Charles M. Stine Award and Prof. Thomas Epps of the University of Delaware received the Owens Corning Early Career Award. The awards were presented by 2015 MESD Chair, Prof. Bryan Vogt and Prof. John Ekerdt and Prof. Don Baird, who chair the respective award committees.

In addition, Graduate Student Poster Award and MESD Undergraduate Student Poster Award winners were announced. Both competitions gather contributions from all five areas of the division: polymers, biomaterials, inorganic materials, electronic and photonic materials, and composites.

Graduate Student Winners (pictured below):

1st place: **Jing Yu**, Michigan State University

Title: *Development of Layered Multi-Scale Porous Thin Films by Tuning Deposition Time and Molecular Weight of Polyelectrolytes.*

Coauthors: Oishi Sanyal, Andrew P. Izbicki and Ilsoon Lee

2nd place: **Qin Chen**, Pennsylvania State University
Title: *Molecular Dynamics Simulation of Twist Solitons in Isotactic Polypropylene Crystals.*
Coauthors: Scott T. Milner

3rd place: **Braden Leigh**, University of Iowa
Title: *Surface Properties of Acrylate Polymers to Direct Neurite Growth.*
Coauthors: C. Allan Guymon, Marlan Hansen, and Kristy Troung

MESD Graduate Student Poster Award Winners. Pictured along with 2015 MESD Chair Bryan Vogt are, (from left to right) Jing Yu, Braden Leigh, and Qin Chen.

Undergraduate Student Winners:

1st place: **Douglas Scott**, University of Delaware
Title: *Writing Highly Ordered Macroscopic Patterns in Cylindrical Block Polymer Thin Films via Raster Solvent Vapor Annealing and Soft Shear.*

2nd place: **Thomas Ludwig**, University of Alabama
Title: *Effect of Ionic Liquid Structure and Dynamics on Liquid-Assisted Exfoliation of Bismuth Telluride: A Molecular Dynamics Study*.

3rd place: **Julian Vigil**, University of New Mexico
Title: *Cobalt-Based Thin Film Nanostructures as Bifunctional Electrocatalysts for Overall Water Splitting.*

Area 8E: Electronic & Photonic Materials 2015 Graduate Student Awards

The 2015 MESD Area 8E (Electronics and Photonics) Graduate Student Award Session took place on Monday, Nov 9 at the Annual Meeting in Salt Lake City. The 7 finalists who presented oral presentations were selected from 12 applicants who had submitted an extended abstract and a letter of recommendation from their dissertation advisor. The winners (listed and pictured below) received monetary awards as well as plaques to honor their achievements.

1st place: **Caleb Miskin**, Purdue University
Title: *Solution-Processed Energy Harvesting Electronic Devices Using Amine-Thiol Solvent Media.* (Advisor: Prof. Rakesh Agrawal)

2nd place: **Anna Hailey**, Princeton University
Title: *Quantifying Energy Barriers and Elucidating Charge Transport Mechanisms Across Interspherulite Boundaries in Solution-Processed Organic Semiconductor Thin Films.* (Advisor: Prof. Lynn Loo)

3rd place: **Thinh Le**, Penn State University
Title: *Contact Doping with Strong Polyelectrolytes for Organic Photovoltaics.* (Advisor: Prof. Enrique Gomez)

Area 8E Graduate Student Award Winners. Pictured from left to right: 1st Place – Caleb Miskin, Purdue University, 2nd Place – Anna Hailey, Princeton University, 3rd Place – Thinh Le, Penn State University.

Area 8B (Biomaterials) Plenary: Pioneers in Biomaterials

Profs. Lonnie Shea (left), Kristi Anseth (center), and Buddy Ratner (right) pose for a picture after the Biomaterials (Area 8B) plenary session, “Pioneers in Biomaterials”. Prof. Ratner began the session with a

fascinating and funny historical perspective of the biomaterials field and ended with some of his current work on pro-healing biomaterials. Prof. Anseth highlighted opportunities for new chemistry in biomaterials, discussing tunable hydrogels to study and mimic *in vivo* 3D tissue environments. The session concluded with a presentation by Prof. Shea on systems tissues engineering, describing new discoveries of how implantable materials might be harnessed to alter tumor cell metastasis. The session ended with a panel Q&A and robust, informal discussions. Thanks to all three pioneering speakers for sharing their perspective and fantastic research with the 125+ members in attendance!

2015 Graduate Student Awards in Area 8A: Polymers

Area 8A (Polymers) continued its Excellence in Polymer Graduate Polymer Research symposium at the 2015 AIChE Annual Meeting in Salt Lake City. This honorary session, sponsored by the *Journal of Applied Polymer Science*, consisted of talks by graduate students who have demonstrated excellent academic performance in chemical engineering research related to polymer science and engineering. The speakers were nominated by their research advisors and selected by a committee to present at the 2015 AIChE Annual Meeting. All 10 finalists presented high-quality work, and the large audience was impressed with the quality of the presentations and research. After careful consideration, the committee selected two winners:

1st place: **Shengchang Tang**, MIT
Title: *Understanding the Hierarchical Relaxation Dynamics in Associating Polymer Networks.* (Advisor: Prof. Brad Olsen)

2nd place: **Jason Koski**, University of Pennsylvania
Title: *Predicting the Equilibrium Structure of Polymer Nanocomposites.* (Advisor: Prof. Rob Riggleman)

Congratulation to all of the finalists and winners!

Kalika Recognized for Service to MESD

At the conclusion of the 2015 Executive Council meeting, Doug Kalika (center) was recognized for his service to MESD as Secretary/Treasurer (since 2007).

Prof. Ryan Toomey (left, elected Secretary/Treasurer in 2015) joins Prof. Bryan Vogt (right, Chair, 2014-2015) in congratulating Prof. Kalika.

Biographical Sketches and Statements of Nominees

CANDIDATES FOR 2ND VICE CHAIR
(VOTE FOR 1)

Thomas Dziubla, University of Kentucky

THOMAS DZIUBLA is the Gill Associate Professor and Director of Graduate Studies in the Department of Chemical and Materials Engineering at the University of Kentucky. He received his B.S. and Ph.D in Chemical Engineering from Purdue University (1998) and Drexel University (2002), respectively. In 2002–2004, he was an NRSA postdoctoral fellow in the Institute for Environmental Medicine at the University of Pennsylvania School of Medicine. His research interests are in the design of functional polymeric biomaterials which can actively control local cellular oxidative stress for improved biomaterial integration and disease treatment. He

holds 8 patents, has authored over 50 peer reviewed publications and is cofounder of Bluegrass Advanced Materials, LLC, which commercializes technology that has originated from his laboratory.

Tom has been an active member in AIChE since his time as a graduate student in 1998. He has chaired and co-chaired numerous sessions for 8a, 8b and 15d/e. He has also been actively involved in the Society for Biomaterials, where he has served as Programming chair for the Drug delivery special interest group for the past 4 years. In this capacity, he was successful in collaborating with a number of other special interest groups to develop co-sponsored sessions as a means of having research presented reach a wider audience in an environment where the number of available sessions was limited. To further the involvement of MESD members with industry, he would like to pursue avenues, which can cater to industrial/academic interactions as a way of bridging the gap between academic research and industrial needs. He will seek to pair young faculty and industrial partners to co-chair sessions and lead invited talks to foster discussion and collaboration.

Elizabeth Lipke, Auburn University

ELIZABETH LIPKE is the Mary and John H. Sanders Associate Professor in the Department of Chemical Engineering at Auburn University. Elizabeth earned her B.S. in Biomedical Engineering from Johns Hopkins University and her Ph.D. in Chemical Engineering in 2005 from Rice University, where she studied under Jennifer West. Following a postdoctoral fellowship at Johns Hopkins School of Medicine with Leslie Tung, Elizabeth joined the faculty in Chemical Engineering at Auburn University in 2008. Elizabeth's research focuses on designing materials for directing stem cell differentiation and tissue engineering applications for which she has earned national recognition including the National Science Foundation CAREER award, a 3M Nontenured Faculty Award, and an American Heart Association Scientist Development Grant.

Elizabeth has been a member of AIChE since 2004 and has actively been involved with MESD since 2008. In addition to having chaired oral sessions and the MESD poster session, Elizabeth served as Area Vice-chair and Area Chair for Area 8b and, most recently, as a MESD Director from 2013 to 2015. From 2009-2013, Elizabeth also worked extensively with AIChE as the Vice-chair, Chair, and immediate Past Chair of the Women's Initiatives Committee (WIC), organizing yearly full-day professional development workshops, as well as the networking luncheon and mixer. During her term as chair, Elizabeth also guided WIC through the formation of subcommittees which were critical in enabling the committee to incorporate more volunteers and increase their impact. Elizabeth is also an active member of the Society for Biomaterials (SFB) and the Biomedical Engineering Society (BMES) and has organized multiple sessions and symposia for both SFB and BMES Annual Meetings.

As second vice-chair, Elizabeth's goals will be to create new opportunities for interactions between members across the range of MESD research areas and to promote participation of early-career chemical engineers from both industry and academia. Through her prior leadership and service on other committees, Elizabeth has a good working knowledge of how to get things done within AIChE. Having actively participated in the MESD Executive Council meetings since 2012, first as the representative from Area 8B and then as an MESD Director, Elizabeth is well-prepared to move forward the goals of MESD, including sustaining and growing the membership, and to create new opportunities for active involvement in MESD.

CANDIDATES FOR DIRECTOR
(VOTE FOR 2)

Wei Fan, University of Massachusetts

WEI FAN is an Associate Professor of Chemical Engineering at the University of Massachusetts, Amherst. He received his B.S. in Materials Science and Engineering from University of Science and Technology of China in 2000 and achieved his MS and Ph.D. in Chemical System Engineering from the University of Tokyo in 2007. He was a postdoctoral fellow in Materials Science and Chemical Engineering Department at University of Minnesota from 2007 to 2010 before starting his academic appointment at UMass in 2010. His research interests are rational

development of porous materials for renewable chemical and fuel production as well as drug delivery systems. Since arriving at UMass he has received a 3M non-tenured faculty award, UMass Barbara H. and Joseph I. Goldstein Outstanding Junior Faculty Award and UMass College of Engineering Outstanding Teaching Award.

Wei has been an active member of AIChE since 2005 and has chaired many sessions in Area 8D (Inorganic Materials) and Area 20 (Catalysis and Reaction Engineering Division). He is the Area Chair of 08D for the 2013 and 2016 fall meeting. He is also an active member and treasurer for Catalysis Society of New England (NECS). He has organized two symposia at 2014 fall and 2015 spring meetings, and established connections with materials and chemical industries. If elected as a director of MESD, Wei will focus his efforts on improving the communications and interactions among industrial scientists, senior and junior scientists, as well as international researchers within MESD at AIChE meetings. The following activities will be undertaken: 1) improving the attendance of industrial scientists by inviting speakers from industries in each area; 2) Increasing attendance of international researchers by including international session chairs, which may lead to more international collaborations and education opportunities; 3) Career support for students and postdocs at the meetings, such as the development of funded student prize symposia, travel awards and future faculty session.

Rohan Hule, ExxonMobil Chemical Company

ROHAN HULE is a Staff Research Scientist within the Global Chemicals Research Department at the ExxonMobil Chemical Company. After earning a B.Tech. in Polymer Science & Engineering from the University Department of Chemical Engineering (UDCT, India) (2002) and a Ph.D. in Materials Science and Engineering from the University of Delaware (2008), he pursued a post-doctoral fellowship in the Chemical Engineering Department at the California Institute of Technology (2010). He started industrial assignments at the Research Triangle Institute (RTI) International prior to his current appointment with ExxonMobil in 2013. Rohan's research interests include investigation and comprehension of block copolymer phase behavior, self-assembly, and polymer structure-property correlations. Current areas of emphasis include polyolefin synthesis and phase behavior, hybrid materials, polymers for energy applications, and carbon capture/sequestration. He also was the recipient of the RTI Early Career Award in 2011.

Rohan has been an active member of Area 8A (Polymers) in MESD. He has chaired and co-chaired numerous scientific sessions in Area 8A. At the 2015 AIChE meeting, he was one of the invited speakers at the 8A Plenary Session. At the 2016 AIChE meeting, he will organize the Rheology and Processing session. Rohan is also actively involved in other scientific organizations that serve the materials community. He has been a member of the APS (DPOLY) Governance Committee since 2014, and has served as a symposium organizer at the APS (DPOLY) and ACS (PMSE). In 2016, he served to organize the DPOLY Short Course on "Polymer Nanocomposites: Challenges and Opportunities." In his current assignment, Rohan is actively involved in establishing new platforms for industry-academia collaboration with a number of universities and Energy/Materials Consortia. As a director of MESD, Rohan would focus on fostering opportunities for interactions among senior and junior scientists within MESD at AIChE meetings. The following activities will be pursued: 1) Encouraging speakers and symposia featuring work that has led to translation of fundamental concepts to applied research or technology geared for the industry, which may lead to opportunities for collaboration between industrial and academic scientists; 2) Increasing crosstalk between the areas within MESD, particularly in the development of new programs for future meetings; and 3) Promoting opportunities for students and postdocs at the meeting.

Christopher M. Jewell, University of Maryland

CHRISTOPHER M. JEWELL is an Assistant Professor in the Fischell Department of Bioengineering at the University of Maryland. Dr. Jewell graduated from Lehigh University with high honors in 2003 with a B.S. in Chemical Engineering and a B.S. in Molecular Biology. He attended graduate school at the University of Wisconsin – Madison, completing his Ph.D. in Chemical Engineering with Professor David Lynn. Chris then joined the Boston Consulting Group in New York City as a consultant in the Healthcare practice,

where his work focused on R&D strategy development for global pharmaceutical and biotechnology clients. In 2009 Dr. Jewell was awarded a Ragon Postdoctoral Fellowship and joined Darrell Irvine's lab at MIT to carry out research in the immune engineering area. He held a concurrent appointment as a Visiting Scientist in the Division of Vaccine Research at Harvard. In August 2012, Chris established his own lab, where his research seeks to understand the interactions between synthetic materials and immune tissues, and exploit these interactions for therapeutic vaccines. Dr. Jewell has published 45 papers and patent, including reports in ACS Nano, PNAS, and Nature. His efforts have been recognized by numerous awards for research and education, including the NSF CAREER Award, the Damon Runyon-Rachleff Innovator Award, the Cellular and Molecular Bioengineering Young Innovator award, the Alliance for Cancer Gene Therapy Young Investigator Award, the Melanoma Research Alliance Young Investigator Award, and selection as the state of Maryland's Outstanding Young Engineer by the Maryland Academy of Science.

Dr. Jewell is a Senior Member of the AIChE and has been active in the society since 2001. He received the Local Chapter's outstanding student award as an undergraduate, and represented AIChE as a New Face of Engineering during National Engineers week in 2012. He has chaired numerous AIChE sessions, served as presenting or corresponding author on more than a dozen talks at AIChE, and is currently the Area Chair of the Biomaterials Area (8B). In this position, Dr. Jewell has led successful initiatives to increase 8B abstract submissions, develop resources to improve year-to-year continuity in the area, and launch area-centric fundraising. As a Division 8 Director, Chris hopes to help grow the visibility of the division by reaching out to members of our field in the increasingly interdisciplinary space, while creating opportunities for comradery across areas within the division.

Jeffrey D. Rimer, University of Houston

JEFFREY D. RIMER is the Ernest J. and Barbara M. Henley Associate Professor of Chemical and Biomolecular Engineering at the University of Houston. Jeff received B.S. degrees in Chemical Engineering and Chemistry from Washington University in St. Louis and Allegheny College, respectively. He then went on to receive his Ph.D. in Chemical Engineering from the University of Delaware and spent two years as a postdoctoral fellow at New York University's Molecular Design Institute within the Department of Chemistry. He started his faculty appointment at the University of Houston in Fall 2009 and was promoted with tenure in Fall 2015. Jeff's research in the area of crystal engineering focuses on the rational design of materials with specific applications in the synthesis of microporous catalysts and adsorbents, and the development of therapeutics to inhibit pathological diseases. Jeff's work has been published in high impact journals such as Science and Nature. He is the recipient of several University of Houston awards for research and teaching, both at the university and college levels. Jeff has also been recognized for national honors such as the ACS Doctoral New Investigator Award, the NSF CAREER Award, and the 2016 Owens Corning Early Career Award from AIChE (MESD).

Jeff currently serves as chair of the Southwest Catalysis Society, vice chair of the International Zeolite Association Synthesis Commission, chair elect for the Gordon Research Conference on Crystal Growth and Assembly, and an advisory board member for the RSC journal Reaction Chemistry & Engineering. He has been an active member in MESD since 2010 and has served as chair/co-chair for sessions in Areas 8B and 8D at AIChE annual meetings between 2010 and 2014. If elected as a director of MESD, Jeff will work with other members of the division's leadership to establish a Graduate Student Travel Award (analogous to other divisions, such as CRE), and to promote industrial participation in MESD sessions as a means of fostering academic – industry interactions.

CANDIDATE FOR SECRETARY/TREASURER
(VOTE FOR 1)

Ryan Toomey, University of South Florida

RYAN TOOMEY is an Associate Professor in the Department of Chemical and Biomedical Engineering at the University of South Florida (USF). Ryan received his Bachelor's degree in Chemical Engineering from the University of California Berkeley in 1995 and his PhD in Chemical Engineering at the

University of Minnesota in 2002, followed by a post-doctoral position at the University of Freiburg in 2003. He joined USF in 2005. His research is in the area of polymers and gels, especially the physics of polymers that deform under external stimuli, including electric, magnetic, and thermal cues. His main technological interest involves the development of polymer coatings that can change properties on command. He is the recipient of a Camille and Henry Dreyfus New Faculty Award and an NSF CAREER Award.

Ryan has been active with AIChE since 2005 and has chaired numerous sessions in Area 8A. He is currently the 2015-2016 secretary-treasurer of the Materials and Engineering Sciences Division (MESD), chair of the Students Chapter Subcommittee (SCC) of AIChE, and co-organizer of the undergraduate poster competition for the 2016 National AIChE student conference. He has also been the faculty advisor for the AIChE student chapter at USF since 2007, which has received the AIChE Outstanding Chapter Award for the last 5 years.

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